

Environmental and Economic Factors Influencing Use of Mineral Admixtures In Concrete Over The Last 25 Years

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ABSTRACT

The cement industry remains one of the most energy-intensive industries even after efficiency measures implemented over the last 25 years. The energy crisis of 1973 forced changes in the type of fuel used at many cement plants and increased energy efficiency. Many cement plants switched to coal in the late 1970s and early 1980s. Since 1980, there has been a gradual trend away from inefficient wet kilns to dry kilns. The 1990 Clean Air Act Amendment set limits on emissions and forced capital outlay for dust collection devices at cement plants. The U.S. Bureau of Mines estimated meeting the requirements of this act would account for 20 to 25 percent of capital expenditures for new cement plants and major additions to existing plants. In the 1990s, use of alternative fuels such as shredded tires and hazardous waste further changed the fuel mix.

Burning limestone and other raw materials to produce clinker during cement manufacture releases CO₂ second only to that of iron and steel production. As global warming becomes of greater concern, the cement industry must further reduce emissions of CO₂ and other noxious gases.

In the past 20 years, sustainable development has brought social, environmental and energy efficiency concerns together with management and governance of natural resources. The concrete and cement industries now use more byproducts including artificial pozzolans and supplementary cementitious materials (SCMs). Natural pozzolans have been used for centuries but only recently have fly ash, silica fume, and blast furnace slag found widespread use. They replace part of the portland cement in concrete or a portion of the clinker in blended cements.